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NUTRITIONAL ASPECTS OF SELECTED STUDIES ON CARDIOVASCULAR DISEASES -- IMPLICATIONS FOR NUTRITION EDUCATION

MARY M. HILL, Ed. D. CONSUMER AND FOOD ECONOMICS RESEARCH DIVISION

People in all walks of life are showing great interest in research on diet and heart disease, particularly atherosclerosis. Such interest is encouraging but is also disconcerting to nutritionists and workers in allied professions who must attempt to (1) answer the many questions raised and (2) discourage self-diagnosis and prescription by the lay public.

The dramatic coverage given in some publications to the reports of specific research projects and the use of this information by advertisers to sell food products and supplements has created public confusion and concern.

Most disturbing are the demands from presumably healthy individuals who are convinced that sound research has already established the need for drastic changes in diet to prevent heart disease. It is not easy to assure such individuals that present knowledge indicates no need for major changes in eating habits of people in normal health, and that it could be dangerous to attempt to make drastic changes in their diet.

Workers in the food and nutrition professions need to know the research underway and its implications for nutrition education.

Research findings that may lead to the formulation of programs for prevention of cardiovascular diseases raise questions of another nature. Workers are concerned about the demands health programs of all kinds are likely to make on staff time of trained personnel as well as the educational background and special competencies that will be needed by staff members in the future.

All programs must, of course, be based on sound research. The establishment of valid information, however, often depends first on attention to methods before relationships can even be investigated. In many cases, meth-

We are indebted to the staff of the Heart Disease Control Program, U. S. Public Health Service for discussing the many nutrition research projects in which they are cooperating and to the investigators who provided information concerning the studies we wished to include in this issue.

odology for gathering and interpreting data precisely must be devised and tested.

Research is being conducted with animals and with people. Many approaches are being used. In this issue of NCN, we describe four current research projects in one area—studies concerned with people and their diets—to illustrate how extensive and complicated a problem this is and the many kinds of studies that provide us with clues for dealing with the practical aspects of the problem.

RELATIONSHIP OF DIETARY HABITS TO DEVELOPMENT OF CARDIOVASCULAR DISEASES

Georgia—Kind and Amount of Fat

We know that patients with atherosclerosis usually have elevated serum cholesterol levels. It is also known that cholesterol levels are affected by the amount and kind of fat in the diet. Levels are reduced by certain vegetable oils and elevated by others—hydrogenated oils and other fats with a high degree of saturation. It has not been demonstrated, however, that the kind of fat in the diet is related directly to the development of atherosclerosis.

To study the relation of dietary habits to the development of atherosclerosis, the staff of the Cardiovascular

Disease Control Service of the Georgia Department of Public Health are studying men of two religious orders—Trappist and Benedictine monks.

Both groups lead similarly restricted lives. The Trappists, however, are lactovegetarians and thus consume a minimum of fat from animal sources. The Benedictines consume an average American diet. This difference in dietary habits had to be established before the groups could be considered suitable for this study.

Most food items are served in restricted amounts in the Trappist monasteries and except for a few foods, such as bread, sugar, and peanut butter, no second helpings are permitted. In the Benedictine monasteries, foods are placed on a common refectory table and the men take as much or as little of each food as desired.

Gathering dietary data has presented some problems. Methods had to be developed to take into account fast days, feast days, and regular days as well as seasonal differences. Because the nutritionists were women, they could not go into the monasteries to set up procedures for gathering data. Some means of reporting amounts had to be developed so that the food records kept by monks could be compared.

The research nutritionist studied sample meals that were sent out to her, and then devised a method of reporting. To check the accuracy of the method, the amount of a given food item each monk reported eaten was totaled and compared with the amount the cook reported he served, less the amount that was returned to the kitchen. These two figures agreed closely when checked many times with different foods.

Diets of the two orders of monks were compared in terms of the average calories per day and the percentage of calories contributed by fat, carbohydrate, and protein. Statistical analysis showed that the two groups differ significantly in their percentage of calories derived from fat. The Trappists had 26 percent of which 43 percent came from animal sources, and 57 percent from vegetable sources. The Benedictines had 45 percent of which 75 percent came from animal sources, and 25 percent from vegetable sources. Thus, these groups were considered suitable for this study.

Dietary data over a period of years along with medical histories, physical examinations, electrocardiograms, chest X-rays, and serum samples (taken at various intervals from each participating monk) and autopsy findings of deceased participants constitute the information for study.

This is a long-term study. It has been in progress for 5 years. Whatever the answers—they will contribute to that body of knowledge that eventually may provide guidelines for the control of atherosclerosis.

New Orleans—Study of Deceased Persons

A research group in the Louisiana State University School of Medicine is conducting a continuing study on persons coming to autopsy at the coroner's office and at Charity Hospital. This group has established that in the New Orleans area, the onset of arterial lesions is early, and the incidence and severity of involvement is high.

The nutrition consultant of the State Board of Health proposed the possibility of relating individual dietary habits of persons autopsied in this continuing LSU study to quantitative measures of atherosclerotic lesions. It is necessary, however, to establish that a living individual can recall the dietary habits of a deceased person.

The consultant believed that the person who plans, prepares, and serves family meals is in a position to report family eating habits and how nearly the deceased person conformed to them. If the deceased person's habits were fairly consistent with family patterns, then it should be possible to use the family pattern as a means of judging dietary intake of the deceased.

Study began in 1960.—In July 1960, the Louisiana State Board of Health, with the help of the U.S. Public Health Service, began to explore the feasibility of such a study. Of the 700 or more autopsies included in the LSU study each year, it was hoped that 100 families suitable for study would be located.

Objectives.—The aims of this study have been twofold: First, to develop reliable methods of collecting dietary data on recently deceased individuals through suitable family members; and second, to use these methods to collect dietary information about persons brought to autopsy in the New Orleans metropolitan area and from whom arterial specimens have been taken and graded for severity of atherosclerosis.

Methods for gathering data.—Approaches to reconstructing the diet of deceased persons were considered. Plans were made to use three approaches at the start of this study.

(1) A 7-day dietary study with suitable and willing families to secure (a) the family dietary intake and (b) an estimated daily food intake of a family member (judged by home food only). Meal hours would also be recorded and nutrients calculated.

(2) A Hypothetical Recall. The living respondent would be asked to recall in terms of the 7-day record the kinds and amounts of food that would have been eaten by the deceased. Habitual meal hours of the deceased person would be recorded and nutrients calculated.

(3) The 7-day record and the hypothetical recall

would produce information for a specific 7-day period. Dietary information of a broader nature would be valuable if available. The researcher would want information concerning (a) the last year of the deceased's life, and (b) lifetime habits regarding intake of certain important foods. Questionnaires used in 16 other studies were used as guides for securing the desired information.

Progress.—After almost 2 years of work, methodology has been planned, improved, and tested. Testing consists of trying a method on living couples to determine whether the wife can give reliable information about her husband's eating habits. If such a method proves successful, it can then be used to collect data from the homemaker about the eating habits of a recently deceased family member.

There is much still to do on methodology. The present methods, however, seem promising because they indicate a close relationship between family intake of nutrients and intake by a family member.

When satisfactory methodology is developed and dietary data on deceased persons are collected and analyzed, a study can be made of possible relationships between dietary habits and atherosclerosis.

Maryland—Childhood Obesity

We know the vulnerable age range—40 to 55 years—for the onset of obvious symptoms of cardiovascular diseases. More information is needed concerning the variables that may be predictors of these diseases. One of these variables is obesity. Since evidence of a relationship between obesity and cardiovascular disease was first noted, insurance data have provided striking corroboration.

Weight reduction, if maintained, exerts a favorable influence on mortality rate with the risk comparable to that of the nonobese. Although many obese persons have reduced weight safely, most of them have not maintained their weight at the lower level. This emphasizes the need for developing effective means of preventing obesity rather than limiting our efforts to weight reduction.

A research team working in Washington County, Maryland has initiated a study to explore the possible relationship between childhood obesity, as determined by a relative height:weight index, and adult morbidity as well as premature mortality. This group wished to study: (1) Uniform, acceptable methods of identifying pathological obesity in children and adults in nonclinical situations. (2) Methods for isolating the contribution of the obesity factor from the other variables related to cardiovascular pathology. (3) The role of childhood obesity in the possible development of irreversible changes in the cardiovascular-renal system. (4) The effect of duration of the

obesity pattern on cardiovascular-renal pathology.

Subjects.—Approximately 2,000 males in the vulnerable group—between 41 and 53 (or deceased)—are being studied. All subjects attended elementary schools in Washington County, Maryland between 1923 and 1928. These men were chosen because their childhood weight status can be determined from school health records and because they, or their mortality records, are now available for study.

Objectives.—(1) To construct a relative height:weight index to be used in placing subjects into weight categories. (2) To determine current health status of the subjects by means of a medical history and physical examination including weight, electrocardiogram, chest X-ray, serum cholesterol, blood sugar, and urinalysis. (3) To abstract from the official mortality records, dates and causes of death. (4) To collect by interview methods weight status information that will permit the construction of a continuous weight profile for individual subjects. (5) To record data that will provide baselines for future analysis and studies—familiar weight patterns, comparative electrocardiograms, serum cholesterols, and the like.

Hypothesis.—Adults who were overweight as children tend to show higher morbidity and mortality rates. These same adults will also tend to cluster in the upper portions of the distributions of measures of blood pressure, serum cholesterol, electrocardiographic characteristics, and weight status.

Procedures.—Childhood-weight status of each adult in the study group will be determined, and analysis will be made of reported morbidity and mortality experience by children in different weight categories. Other variables such as blood pressure, serum cholesterol, electrocardiographic characteristics, and present weight-status will be analyzed as possible predictors in the development of atherosclerosis or coronary artery disease.

Implications for nutrition education.—If the findings of this study support the hypotheses, obesity in children will probably be an important consideration in the development of preventive programs for cardiovascular diseases. Nutrition education programs directed to children and their parents will play an important role in the prevention or correction of childhood obesity.

DIET MODIFICATIONS

It is known that serum cholesterol can be reduced by changes in the diet, and that it is affected more by the type of dietary fat than by the amount of dietary cholesterol present in ordinary foods. It is not known whether the reduction of serum cholesterol is of value in prevent-

ing or treating atherosclerosis in man. The ability of a particular food pattern to sustain desirable serum cholesterol levels needs to be tested. Then the feasibility of using such a pattern for a population group needs to be established.

Cleveland Clinic staff develops a diet pattern.—Up to this time, substitution of cottonseed and corn oil for most of the animal fats in man's diets has been made only in carefully controlled formula diets. A research team at the Cleveland Clinic began work on the development of a practical diet pattern to meet these criteria: (1) Contains acceptable, tasty foods. (2) Is flexible enough to allow for adaptation to all age groups. (3) Is adjustable to the demands of daily life (4) Includes foods in amount and variety for all types of social events and cultural customs.

Pattern evolves. A research kitchen was set up similar to a home kitchen. Menus, foods, and recipes were all familiar to local housewives, and foods were prepared by usual methods.

Normal volunteers ate the test diets—about six persons to each test. Forty volunteers participated while carrying on their usual activities. Participants ate all meals from the research kitchen for 18-day periods. During this time, serum cholesterol was determined frequently. Weighed portions of food were served and the fat content was determined in the laboratory. All meals were nutritionally adequate.

A slightly modified cottonseed oil, not available on the market, was used in test diets. The choice was a good one. It was an excellent shortening, emulsified well with nonfat milk solids to make filled milk, cream, ice cream, and a spread; produced a good salad dressing; made a good seasoning in sauces and gravies; and could also be used in cooking vegetables and meats, and in the preparation of casserole dishes.

The first test was a vegetarian diet. Later tests included selected meats, and limited amounts of eggs and Cheddar cheese. In some of the later diets, animal fat was included amounting to a daily intake of about 20 grams or approximately 6 percent of the calories.

Progress and problems.—These tests have proved that the vegetable-oil food pattern as served from the research kitchen reduced serum cholesterol levels in these normal individuals. More testing will, of course, be needed to determine the feasibility of this pattern for large-scale use and its value in preventing cardiovascular diseases.

This is important research, however, because it will be helpful to have good evidence to show whether it is easier (1) to promote changes in food habits (selection of foods that provide a diet with a high proportion of polyunsaturated fat) or (2) to gain acceptability of new and different foods (products in which saturated animal fat has been replaced with unsaturated vegetable fat) should such dietary change prove to be an important preventive measure.

IN CONCLUSION

The time and diligence of devoted researchers seeking answers to a great spectrum of questions indicates that specific preventive programs for heart disease, particularly atherosclerosis, will not be developed overnight.

Meanwhile, we, as nutritionists, should be as well informed as possible about research findings, and what they may mean for the dietary management of health. We know, for example, that the amount and kind of fat in the diet seem to be factors in the etiology of atherosclerosis; that cholesterol, a product of metabolism, is a normal constituent of blood serum of all individuals and that serum cholesterol levels can be affected by the kind of fat in the diet. We are also sure that obesity is not conducive to best health and longevity.

The increasing concern of people about the relation of diet to health provides an excellent opportunity for nutritionists to stress well-balanced diets for persons in normal health. This means variety and moderation in all food selection, but particularly moderation in calories. This is the best health insurance we know at present.

The research described in no way indicates either the number or variety of projects underway but it has implications for professional training. Nutritionists need to be thoroughly grounded in the basic sciences and highly skilled in working with all age groups. Tomorrow's nutritionists will certainly need these same basic skills.

There are many opportunities now for persons with strong background in nutrition and facility in working with people. The prospects seem to be greater for the future. The number of students preparing themselves to work in the field of applied nutrition appears to be alarmingly small, however.

The success of future programs in applied nutrition may well depend on interest in the profession being generated today.